

Phase Transitions and Tricriticality in the Lattice-Restricted Primitive Model Supplemented by Short-Range Interactions

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Monte Carlo simulations in the grand canonical ensemble have been performed to obtain the phase behavior of the lattice restricted primitive model with additional short-range attractive interactions. Multihistogram reweighting techniques were used to obtain the phase diagrams as a function of the parameter ϵ^* , measuring the relative strength of the short-range (SR) to the Coulombic interactions. The results reveal a great variety of behaviors as ϵ^* is varied. Specifically, for weak or vanishing SR interactions only order-disorder phase transitions and a tricritical point are found, while for strong SR interactions the high-density ordered phase becomes incommensurate with the lattice structure and only a gas-liquid coexistence and a critical point are observed. However, for a certain range of ϵ^* between these two limits both the critical and the tricritical points can become stable.